

Microfluidic chip

Claims

1. Microfluidic chip for biological, chemical, and medical analysis, in which cavities and channels that connect the former with one another, which channels transport fluids required for the analysis, on the basis of the capillary effect, are disposed, whereby at least one of these cavities is a reaction chamber characterized by
a layered construction of light-curing hydrophilic plastic material, on the basis of a 3D layer model, and a cover layer made of a hydrophobic material, whereby channels (6, 8) that come out of different cavities (1, 2), and run without intersections in the layer body structured from hydrophilic material empty into the at least one reaction chamber (7).
2. Microfluidic chip according to claim 1, characterized in that
a central cavity (1) covered by the hydrophobic layer is generated in the chip, which cavity is surrounded by a cavity (2) configured in ring shape, which also has openings

(4) covered by the hydrophobic layer, separated from one another by means of crosspieces (5), from which openings one channel (8), in each instance, leads to a reaction chamber (7) assigned to the opening, which reaction chamber is disposed around the central cavity (1) and around the ring cavity (4), with other reaction chambers, in star shape, while channels (6) that are placed in the surface of the crosspieces (5), bridging the ring cavity (2), lead from the central cavity (1) to the assigned reaction chamber (7), in each instance, whereby the channels (6, 8) that proceed from the ring cavity (2) as well as from the central cavity (1) make a transition into grooves that are open towards the interior of the cavities (1, 2) and rise in the walls of the cavities (1, 2), in perpendicular manner.

3. Microfluidic chip according to claim 2,
characterized in that
the channels (6, 8) that are disposed vertically in the walls form an acute angle with the bottom surface at their cavity-bottom-side end.
4. Method for the production of a cover layer for a microfluidic chip according to claims 1 to 3,
characterized in that

first, a film of one or more layers of light-curing plastic material is generated, whereby the final layer is only partially polymerized, after which the film formed in this manner is laid onto the microfluidic chip generated previously, with the partially polymerized layer, and the layer that was only partially polymerized up to that time is polymerized through, so that the chip is given a monolithic structure.

5. Method according to claim 4,
characterized in that
the film is continuously produced between at least one pair of rollers, whereby the light-curing material is disposed between the two rollers, one of which has the exposure device that serves for curing, and the cover layer produced in this manner is laid onto the microfluidic chips that are produced in large numbers, and polymerized through, also using a continuous method.